Review

Cost-Effectiveness of Digital Mental Health Interventions in Community-Based Care: Systematic Review

Adieza Farahain[1], MSc, MD; Misra Helma Firdaus[1], MBBS, MPH, DrPH; Faiz Daud[1], DBA; Suzaily Wahab[2], MMed (Psych), MD; Maziah Ahmad Marzuki[3], PhD; Ali Algumaei[4], MD; Noorayisahbe Mohd Yaacob[4], PhD; Mohd Rizal Abdul Manaf[1], PhD

[1]Department of Public Health Medicine, Faculty of Medicine, Universiti Kebangsaan Malaysia, Cheras, Kuala Lumpur, Malaysia
[2]Department of Psychiatry, Faculty of Medicine, Universiti Kebangsaan Malaysia, Cheras, Kuala Lumpur, Malaysia
[3]Department of Nursing, Faculty of Medicine, Universiti Kebangsaan Malaysia, Cheras, Kuala Lumpur, Malaysia
[4]Faculty of Information Science and Technology, Universiti Kebangsaan Malaysia, Bangi, Selangor, Malaysia

Corresponding Author:

Mohd Rizal Abdul Manaf, PhD
Department of Public Health Medicine, Faculty of Medicine
Universiti Kebangsaan Malaysia
Jalan Yaacob Latif, Bandar Tun Razak
Cheras, Kuala Lumpur 56000
Malaysia
Phone: 60 391455888
Email: mrizal@hctm.ukm.edu.my

Abstract

Background: Mental health conditions are a leading cause of disability and economic burden worldwide. Digital mental health interventions (DMHIs) may widen access, but economic evidence from community mental health settings, including low- and middle-income countries (LMICs), has not been synthesized by perspective, time horizon, and comparator type.

Objective: This study aimed to assess the cost-effectiveness of DMHIs delivered in community mental health settings.

Methods: This systematic review followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) 2020 guidelines and was registered with the International Prospective Register of Systematic Reviews (PROSPERO CRD420251141326). PubMed, Scopus, the Directory of Open Access Journals, and the Cochrane Library were searched for economic evaluations published from January 2010 to June 2025 involving adolescents (aged 10 years and older) through older adults with mental disorders. Two reviewers independently screened studies, and the quality was appraised using the Consensus on Health Economic Criteria (CHEC) list. Costs were standardized to 2025 US $, and findings were synthesized narratively.

Results: Of 2478 records identified, 20 economic evaluations were included: 16 randomized controlled trials, 3 decision-analytic models, and 1 uncontrolled single-arm study, conducted in high-income countries and LMICs (Kenya, Lebanon, China, and Southeast Europe). Depression (n=11, 55%) and anxiety (n=7, 35%) were the most frequent targets. Of 20 studies, 10 (50%) used a health care payer perspective only, 1 (5%) study used a societal perspective only, and 9 (45%) used both perspectives; time horizons ranged from 2 weeks to 10 years. Thirteen (65%) studies were cost-effective at the willingness-to-pay thresholds applied, and 4 (20%) were not; 3 (15%) did not state a threshold. Among the 16 studies reporting quality-adjusted life years, 4 (25%) were dominant (less costly and more effective), 11 (69%) were more costly and more effective, and 1 (6%) was less costly and less effective. The BlueIce smartphone app for self-harm and the NIDUS-Family (New Interventions for Independence in Dementia Studies) dementia intervention were dominant, whereas a societal perspective made some interventions cost-saving, such as Step-by-Step in Lebanon. Interventions that were not cost-effective included those evaluated in Germany, the United States, and Southeast Europe, and 1 psychosis trial with a high incremental cost-effectiveness ratio. Methodological quality was high in 15 (75%) studies, moderate in 4 (20%), and low in 1 (5%).

Conclusions: DMHIs in community settings can offer good value for money, particularly guided internet-based cognitive behavioral therapy for depression and anxiety, and may be cost-saving from a societal perspective. The evidence is limited by short time horizons (often 12 months or less), waitlist and usual care comparators, and heterogeneous outcome measures.

Future evaluations should use longer follow-ups, active comparators, and a common utility measure, ideally the EQ-5D questionnaire.

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Introduction

Mental health conditions pose a significant global public health challenge, contributing to substantial disability and economic burden. Mental disorders are a major contributor to global disability, accounting for 17.2% of total years lived with disability worldwide [1]. In 2020, approximately 1.1 billion people—nearly 1 in 7 individuals—were living with a mental disorder [2].

In Malaysia, mental disorders account for 8.6% of total disability-adjusted life years, and it has been estimated that 1 in 3 Malaysians experience some form of mental health issue [3]. Economically, the global cost of mental disorders is projected to rise to US $6 trillion by 2030, from US $2.5 trillion in 2010 [4]. In Malaysia, the economic burden is projected to exceed US $25 billion by 2030, approximately 7.6 times higher than the US $3.3 billion estimated in 2018 [5]. Consequently, public service capacity remains limited, with only 0.52 to 1 psychiatrist per 100,000 people, which exacerbates long waiting times, inequitable service distribution, access barriers, constrained funding, and persistent stigma [3,6].

To address these critical constraints and improve health outcomes, digital mental health interventions (DMHIs) are increasing in importance [7]. These interventions, including mobile apps, web-based programs, telepsychiatry, and integrated digital care platforms, are in high demand and have received increasing research attention in community and outpatient settings [8].

A substantial body of primary studies now exists. Taken together, these studies examine diverse populations, mental illnesses, intervention modalities, and multiple economic outcomes. Nevertheless, despite the growing evidence base, existing systematic reviews are limited in scope. For instance, most reviews have concentrated on clinical effectiveness, with little attention to the economic value of interventions [9].

Many reviews also combine inpatient and community settings, and few summarize through a structured economic lens (perspective or time horizon) [8,10]. As a result, we still lack a consolidated, focused synthesis showing which DMHIs are cost-effective in community-based mental health services across different mental disorders and regions, including low- and middle-income countries (LMICs), that includes both trial-based and model-based economic evaluations.

This review aims to extend the literature by mapping the economic perspectives and time horizons used in existing studies, reporting on both quality-adjusted life year (QALY)–based analyses and cost-effectiveness analyses (CEAs) that use clinical outcomes, and incorporating evidence from LMIC settings, which are often missing from reviews conducted in high-income countries (HICs) [11]. Most importantly, this review provides evidence to inform policymakers in prioritizing high-value interventions for scaling up in community settings.

Therefore, this systematic review aims to assess the cost-effectiveness of DMHIs in community mental health services. It will provide a structured synthesis of economic outcomes, examine the roles of perspective and time horizon, include an appraisal of study quality, and offer clear implications for policy, service planning, and future research.

Methods

Conducting Systematic Literature Reviews

This systematic review was conducted in accordance with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines; the completed PRISMA 2020 abstract checklist and the PRISMA 2020 checklist are provided in Checklists 1 and 2, respectively. The review protocol was registered with the International Prospective Register of Systematic Reviews (PROSPERO registration number CRD420251141326). We aimed to comprehensively review the methodological approaches and cost-effectiveness of digital health interventions in community mental health settings. In view of relevant adolescent-focused digital mental health economic evaluations identified during the screening, the eligibility criterion was extended from adults (≥18 y) to include adolescents (from age 10, per the World Health Organization [WHO] definition) subsequent to registration. This postregistration amendment is documented in the PROSPERO record (version 1.1, September 21, 2026) and is reported here in accordance with PRISMA 2020 guidance on protocol amendments.

Research Question Formulation

Population, Intervention, Comparator, Outcome Framework

Specifically, the main research question was as follows: "Are digital health interventions cost-effective in managing outpatients with depression and anxiety in community mental health settings?"

The review uses the PICO (population, intervention, comparator, outcome) framework to formulate the research question, ensuring a comprehensive and systematic synthesis

of available economic evidence on this emerging health care approach. This framework was selected because it provides a structured and comprehensive approach for synthesizing evidence on the economic evaluation of digital health interventions in community mental health.

Population (P)

The population consists of individuals, specifically adolescents aged 10 years and above, per WHO definition, to older adults, diagnosed with mental health disorders and receiving care in community-based mental health settings. Community-based settings were defined as care delivered outside inpatient or hospital admissions, including community mental health centers, community psychiatry teams, outpatient community clinics, and psychiatric interventions in community services. Purely inpatient, hospital-based, and primary care (nonspecialist) settings were explicitly excluded. LMICs and HICs were classified according to the World Bank income classification at the time of each study's publication. Populations were excluded if they were receiving purely inpatient or hospital-based psychiatric care, had no formal diagnosis of a mental health disorder, or were below the age of 10 years.

Intervention (I)

Digital health interventions encompassing mobile health (mHealth) apps, internet-based or online programs, computer-assisted cognitive behavioral therapy (CBT), telepsychiatry, SMS reminders, and blended care models, regardless of the level of human guidance offered (fully digital or guided). The key criterion is that the interventions are specifically designed for mental health support or therapy, implemented by, integrated with, or delivered via community mental health services. Interventions were excluded if they had only a minor digital component in a predominantly face-to-face program.

Comparator (C)

Standard care practices typically offered in these settings, which may include traditional face-to-face therapy, wait-list control conditions, alternative nondigital psychosocial interventions, or no specific additional intervention.

Outcome (O)

Primary outcomes consist of economic evaluation data, including cost-effectiveness, cost-utility, cost-benefit analysis, incremental cost-effectiveness ratio (ICER), cost per QALY, cost per clinical response or remission, incremental costs and effects, net monetary benefit (NMB), and cost-benefit ratios. Studies were excluded if they only reported clinical outcomes and lacked cost or resource-use data. The review also considers the clinical or health-related quality of life (HRQoL) measures used to derive these economic outcomes.

Data Sources and Search Strategy

Following the establishment of the research question and objective, the review was conducted in September 2025. Data for this systematic review were identified by searching 4 major electronic databases: PubMed, Scopus, the Directory of Open Access Journals (DOAJ), and the Cochrane Library. These databases were selected to ensure extensive coverage of peer-reviewed literature across the fields of mental health, health economics, and digital health interventions.

The search was restricted to studies published between January 2010 and June 2025. This 15-year time frame was chosen to capture the evolution of digital health technologies and the most contemporary evidence on their economic evaluation within community mental health settings, reflecting current methodologies and policy-relevant findings.

The search strategy used a combination of keywords and Boolean operators tailored to economic evaluations in community mental health settings. Search terms were structured according to the PICO framework to ensure the systematic and comprehensive retrieval of relevant studies. The detailed search strings applied in each database are provided in Multimedia Appendix 1. In addition, no further eligible studies, aside from the records found in the database search, were identified through hand-searching the reference lists of all included papers.

Inclusion and Exclusion Criteria

The inclusion and exclusion criteria were carefully formulated to ensure the relevance, quality, and methodological rigor of the studies reviewed. Inclusion criteria were defined to capture original empirical research with primary data, published in English between 2010 and 2025, that directly assessed any form of digital health intervention for individuals with a diagnosed mental illness in community settings, using an economic evaluation framework. We included both trial-based analyses and model-based evaluations.

Exclusion criteria were applied to maintain the focus and integrity of the review. Studies were excluded if they did not focus on community mental health settings; were review papers, editorials, conference papers that often duplicate data later published as full papers, or proceedings; or lacked economic evaluation components. These sources were excluded as they do not provide original data suitable for systematic synthesis of economic evaluations.

Eligibility

The reference management and screening were conducted manually using Excel spreadsheets, given the manageable volume of records. Title/abstract and full-text screening were conducted independently by 2 reviewers (AF and MHF) using predefined inclusion and exclusion criteria, with any disagreements resolved through consultation with a third reviewer to reach consensus. Following this assessment, 20 studies met the inclusion criteria and were included in the final systematic review. The PRISMA flow diagram was incorporated as part of the quality assurance process, providing transparent documentation of study selection and reasons for exclusion at each stage, in accordance with PRISMA 2020 guidelines.

Data Extraction

All authors (AF, MHF, FD, SW, MAM, NMY, AA, and MRAM) independently extracted information from each eligible paper using a standardized Excel spreadsheet. The extraction process was reviewed collaboratively, with any discrepancies resolved through discussion and consensus among the review team. We piloted the extraction form on a subset of included studies before full-scale data extraction. The extractors then compared the outputs and resolved any discrepancies to ensure consistency, accuracy, and methodological rigor for the remaining studies.

Data extraction was guided by a structured form designed to capture key study characteristics, including authorship, year of publication, region, study design, study population, type of mental illness, type of digital health intervention, comparator, type of economic evaluation, perspective, time horizon, discounting approach, outcomes, and outcome-measuring tools.

The outcomes were categorized into incremental cost (ΔCost), clinical effectiveness, effectiveness used to derive the economic metric (ΔEffect), and the ICER. Because the EQ-5D questionnaire (3-level [3L] and 5-level [5L] versions) was the most frequently used utility instrument, it was treated as the reference (economic anchor) for describing cost-utility results. Utilities from other instruments (Short-Form Six-Dimension [SF-6D], 12-item Short-Form Health Survey [SF-12], Child Health Utility Nine-Dimension [CHU-9D], and Recovering Quality of Life [ReQoL]) were retained but interpreted in relation to the EQ-5D.

Data Synthesis

Because of expected heterogeneity in interventions, comparators, outcomes, perspectives, and time horizons, we conducted a structured narrative synthesis. Monetary values were standardized where possible, and findings were synthesized by examining the incremental costs and effects across intervention types, mental illnesses, and study designs.

Focus was given to how differences in perspective and time horizon influenced the cost-effectiveness conclusions. Meta-analysis and secondary modeling were not conducted, and therefore formal uncertainty metrics (CIs and cost-effectiveness acceptability curves [CEACs]) were not synthesized. Conclusions are based on reported point estimates, consistency across studies, and study quality.

Quality Appraisal and Risk of Bias Assessment

The quality appraisal was conducted independently by the reviewers (AF and MHF), with any discrepancies resolved through consensus to minimize bias and ensure transparency. The included studies comprised economic evaluations conducted alongside randomized controlled trials (RCTs), decision-analytic models, and one uncontrolled single-arm study. Hence, each study was assessed using the 2005 Consensus on Health Economic Criteria (CHEC) list [12] as the primary tool to appraise methodological quality. The 19-item CHEC list covers key domains such as study population, comparator, perspective, and the measurement of costs, outcomes, and analytic approaches. We selected CHEC in accordance with our registered protocol. Integrating the Consolidated Health Economic Evaluation Reporting Standards (CHEERS 2022), which assesses reporting quality across trial- and model-based economic evaluations, represents a valuable direction for future updates.

Two reviewers independently rated each item as Yes/No/Unclear/N/A. With N/A removed from the denominator and disagreements resolved by discussion, we calculated a percentage score and categorized studies as high (≥75%), moderate (50%-74%), or low (<50%) quality. These percentage categories are a descriptive convention rather than a validated threshold, so item-level ratings are also reported. The item-level ratings are provided in Multimedia Appendix 2. Overall, most of the studies (15/20, 75%) were high quality, 4 of 20 (20%) studies were moderate, and 1 of 20 (5%) was low. Although CHEC scores varied due to factors like short time horizons, limited capture of indirect costs, inconsistent discounting approaches, and restricted uncertainty analysis in some trials, these patterns reflect differences in study architecture rather than poor quality; for example, the naturally shorter follow-up periods of RCTs compared to long-term simulation models.

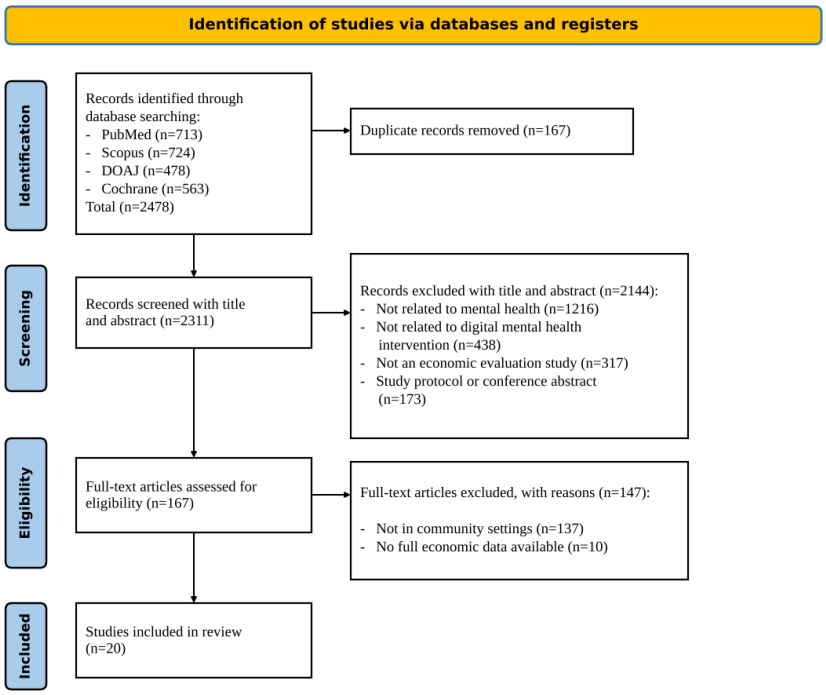
This indicates that the body of evidence synthesized in this review is methodologically robust and provides a reliable foundation for evaluating the cost-effectiveness of digital health interventions in community mental health settings.

Results

Search Results

The results of the data extraction and selection process are shown in Figure 1. The systematic literature search identified a total of 2478 papers. Following the removal of 167 duplicates, 2311 papers were screened based on titles and abstracts, which resulted in 167 full-text papers being assessed for eligibility. A sequential screening process ultimately led to the inclusion of 20 studies in the final review and synthesis. The primary reasons for exclusion at the full-text stage were studies not conducted in community settings (n=137) and a lack of full economic evaluation data (n=10).

Figure 1. Study selection process according to the PRISMA flowchart. DOAJ: Directory of Open Access Journals; PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analyses.



The Characteristics of the Studies

The included studies were heterogeneous in several aspects, including countries, populations, types of intervention, mental illnesses, and methodological characteristics (study design, economic evaluation type, perspective, time horizon, comparator, and outcome measures). The studies reviewed span publication years from 2010 to 2025.

Geographic and Age of Population and Sample Size

The included studies were geographically diverse, encompassing several HICs and multiple LMICs. High-income regions included the United States and several European countries (Sweden, the United Kingdom, and Germany). This also included modeling studies focused on the German health care system. Additionally, studies were conducted in Australia and Japan. Studies from LMICs included trials conducted in Kenya, Lebanon, and China, as well as a trial conducted across 5 Southeast European nations.

The populations studied ranged from adolescence to older adulthood. Studies focusing on adolescents and younger adults included Kenyan high school students receiving a depression intervention [13], adolescents in the United Kingdom receiving a self-harm intervention [14], and young individuals with first-episode psychosis [15]. The demographic of adults aged 18 years and older formed the majority, represented by 14 (70%) studies. Studies also included carers of people with dementia and parents of young children. Regarding sample sizes, they varied widely. RCT samples ranged from 25 to over 1000 participants, while one model-based study for depression in Germany used a cohort size of approximately 4.9 million adults.

Digital Mental Health Interventions

The digital interventions were diverse and were categorized into 5 modalities. Internet-based cognitive behavioral therapy (iCBT) accounted for 5 of the 20 (25%) studies, of which 4 were guided, and 1 was unguided; guidance was typically provided by trained mental health professionals by message or email, or in real time by phone, video, or chat. Computer-assisted cognitive behavioral therapy (CCBT) comprised 3 (15%) studies, and mHealth apps accounted for 4 (20%) studies, offering features such as mood diaries and psychoeducation. A further 3 (15%) studies evaluated online recovery or social platforms, and 5 (25%) studies evaluated other digital programs (a single-session online intervention, a digital parenting program, remotely delivered goal-setting support for dementia, and telemedicine).

Types of Mental Illness

Depression was the most frequently targeted disorder (11/20, 55%), followed by anxiety disorders (7/20, 35%). Psychotic disorders were the focus of 3 (15%) studies, while dementia was the focus of 2 (10%) studies and substance use disorders in 2 (10%) studies. Single studies addressed stress-related disorders, obsessive-compulsive disorder (OCD), self-harm, and conduct problems.

Outcome Measurement Tools

The effectiveness of the interventions was measured across clinical symptoms; health utility and quality of life (QoL); and functional and economic resource use. Clinical measurement tools followed the focus on mental illness in the

studies, dominated by the 9-item Patient Health Questionnaire (PHQ-9) for depression (7/20, 35%) and the Generalized Anxiety Disorder-7 (GAD-7) for anxiety. Health utility and QoL outcomes were commonly assessed using the EQ-5D (3L/5L) in 10 out of 20 studies.

Functional outcomes were captured across aspects of daily functioning, productivity, and social performance using questionnaires such as the Bristol Activities of Daily Living Scale (BADLS), the Sheehan Disability Scale (SDS), the Work and Social Adjustment Scale (WSAS), and the Personal and Social Performance Scale (PSP). The economic resource use was calculated through standardized inventories such as the Client Service Receipt Inventory (CSRI; 6/20, 30%) and the Trimbos/iMTA Questionnaire for Costs Associated with Psychiatric Illness (TiC-P; 3/20, 15%). Lastly, 2 studies used outcomes specific to substance use [16,17] and personalized goal-based measures such as Goal Attainment Scaling [18,19].

Study Design

The majority of the included studies (16/20, 80%) consisted of economic evaluations conducted alongside RCTs. Another 3 (15%) studies used decision-analytic Markov models to project long-term costs and outcomes, while 1 (5%) study applied a 24-month, single-arm, uncontrolled trial.

Types of Economic Evaluation

Most studies were cost-utility analyses (CUAs) measuring cost per QALY (17/20, 85%). Of these, 11 studies focused only on QALYs as the primary outcome, while 6 studies overlapped QALYs alongside the evaluation of clinical outcomes. One study [17] included a cost-per-QALY analysis but focused on the cost per year of abstinence due to an insignificant difference in QALYs between treatment arms. For this reason, it is not shown on the cost-effectiveness plane. In addition, 9 studies used CEAs, including 3 studies that relied only on CEA, measuring cost per clinically meaningful improvement [13], cost per drug-free specimen [16], and cost per treatment response and remission [20].

Perspectives

Of 20 studies, 10 were from the health care payer perspective only, 1 from the societal perspective only, and 9 adopted both perspectives. Although provider perspectives predominated, nearly half of the studies extended their evaluations to additionally capture broader societal costs.

Time Horizon

Time horizons varied from very short (2 wk) to long-term modeling (10 y). Most RCTs had follow-up periods ranging from 2 weeks to 12 months, although model-based studies used horizons from 3 to 10 years.

Comparator

Following the classification system of Gold et al [21], comparator groups were categorized across the 20 studies. Of the 20 studies, 13 (65%) used treatment as usual or usual care, defined as existing community mental health services without a digital component. Meanwhile, 3 (15%) studies relied on waitlist or delayed-access control, 2 (10%) had no treatment or no comparator, and 2 (10%) used active comparators (an active online control and face-to-face CBT). This detailed overview is presented in Table 1.

Table 1. Characteristics of all studies included in the systematic review.

Author (year)	Country	Population	Psychiatric illness	Digital intervention		Outcomes	Measuring tools
				Intervention (I)	Comparator (C)		
Paterson et al [18], 2025	United Kingdom	Adults	Dementia	Independence-preserving digital intervention	No treatment	QALYs[a]	EQ-5D-5L[b], DEMQoL[c]
Isaaq et al [19], 2025	United Kingdom	Adults and caregivers	Dementia	NIDUS-Family[d] (psychosocial goal setting)	Treatment as usual	QALYs	DEMQOL-proxy
Wasil et al [13], 2021	Kenya	Adolescents	Depression	Shamiri-Digital (single session)	Active online control	Depression symptoms	PHQ-8[e]
Zhou et al [22], 2025	China	Adults	Major depressive disorder (MDD)	Unguided internet-based CBT[f] (“Morning Mood”)	Waitlist control	QALYs	SF-6D[g]
Ali et al [23], 2024	United States	Adults	Depression	Computer-assisted CBT (CCBT)	Treatment as usual	QALYs, treatment response	SF-12[h], PHQ-9[i]
Kraepelien et al [24], 2018	Sweden	Adults	Depression	Internet-based CBT (iCBT)+physical exercise	Treatment as usual	QALYs, depression response	EQ-5D, MADRS[j]
Baumann et al [25], 2020	Germany	Adults	Unipolar depression	iCBT	Face-to-face CBT	QALYs	EQ-5D

Author (year)	Country	Population	Psychiatric illness	Digital intervention		Outcomes	Measuring tools
				Intervention (I)	Comparator (C)		
Freitag et al [26], 2024	Germany	Adults	Depression	mHealth[k] apps (German reimbursable digital health applications)	Standard care	QALYs	EQ-5D
Pyne et al [27], 2010	United States	Older adults	Depression	Telemedicine-enhanced antidepressant management	Usual care	QALYs, depression-free days	SF-12
Palmer et al [28], 2023	United Kingdom	Adults and children	Depression	"Parent Positive" digital parenting program	Follow-up as usual	QALYs, child emotional outcomes	CHU-9D[l], SDQ[m]
Richards et al [29], 2020	United Kingdom	Adults	Depression/ anxiety	Internet-delivered CBT (SilverCloud)	Waitlist control	QALYs, depression/ anxiety reduction	EQ-5D-5L, PHQ-9, GAD-7[n]
Abi Hana et al [20], 2024	Lebanon	Adults	Depression	Step-by-step (SbS) guided digital self-help	Enhanced usual care	Treatment response and remission	PHQ-9
Olmstead et al [16], 2010	United States	Adults	Substance dependence	Computer-based CBT	Treatment as usual	Drug-free specimens	Urinalysis
Murphy et al [17], 2016	United States	Adults	Substance disorder	Therapeutic education system (TES)	Treatment as usual	QALYs, abstinent year	EQ-5D
Slade et al [30], 2024	United Kingdom	Adults	Psychotic disorder	NEON[o] online recovery narratives	Waitlist (delayed access)	Quality of life	MANSA[p], EQ-5D-5L
Engel et al [15], 2024	Australia	Young people	Psychosis	Horyzons online social therapy	Treatment as usual	QALYs, social functioning	PSP[q], AQoL-8D[r]
Feng et al [31], 2022	Southeast Europe	Adults	Psychosis	DIALOG+ app-based intervention	Standard care	QALYs, Quality of life	EQ-5D-5L, MANSA
Matsumoto et al [32], 2024	Japan	Adults	OCD[s]	Guided iCBT for OCD	No comparator (baseline benchmark)	QALYs, OCD severity	EQ-5D-5L, Y-BOCS[t]
Slade et al [33], 2024	United Kingdom	Adults	Nonpsychotic mental illness	NEON online recovery narratives	Usual care	Quality of life	MANSA, EQ-5D-5L
Morrish et al [14], 2024	United Kingdom	Adolescents	Self-harm	BlueIce smartphone app	Usual care	QALYs, self-harm behavior	CHU-9D

[a]QALY: quality-adjusted life year.
[b]EQ-5D-5L: EQ-5D 5-level version.
[c]DEMQoL: dementia quality of life.
[d]NIDUS: New Interventions for Independence in Dementia Studies
[e]PHQ-8: 8-item Patient Health Questionnaire.
[f]CBT: cognitive behavioral therapy.
[g]SF-6D: Short-Form Six-Dimension.
[h]SF-12: 12-item Short-Form Health Survey.
[i]PHQ-9: 9-item Patient Health Questionnaire.
[j]MADRS: Montgomery-Asberg Depression Rating Scale.
[k]mHealth: mobile health.
[l]CHU-9D: Child Health Utility Nine-Dimension.
[m]SDQ: Strengths and Difficulties Questionnaire.
[n]GAD: generalized anxiety disorder.
[o]NEON: Narrative Experiences Online.
[p]MANSA: Manchester Short Assessment of Quality of Life.
[q]PSP: Personal and Social Performances Scale.
[r]AQoL-8D: Assessment of Quality of Life Eight-Dimension.
[s]OCD: obsessive-compulsive disorder.
[t]Y-BOCS: Yale-Brown Obsessive Compulsive Scale.

Cost-Effectiveness Findings

Ahead of presenting these outcomes, we briefly define key health economics terms for readers less familiar with health economics methodology. First, the ICER represents the additional cost required to achieve one additional unit of health benefit (such as cost per QALY gained) compared to the comparator. A lower ICER signifies better value, and an intervention is considered cost-effective if its ICER falls below the chosen willingness-to-pay (WTP) threshold. Second, the QALY is a standardized outcome measure that combines life expectancy and QoL. In practical terms, a QALY gain reflects additional time lived in full health (or an equivalent improvement in HRQoL over a given period); even small QALY gains can represent meaningful

population-level benefit when interventions are delivered at scale and at low cost. Finally, NMB converts health gains into monetary value based on the WTP threshold, allowing value comparisons of different interventions on a single monetary scale. Economic evaluations compare the incremental cost of the digital intervention with the incremental health benefit it produces, which is expressed as an ICER. This ratio is judged against a WTP threshold. Where reported, WTP thresholds varied widely across geographic contexts, stretching from the UK's localized National Institute for Health and Care Excellence (NICE) framework (£20,000-£30,000 per QALY [£1=US $1.27-1.32; varies with study year]) to conventional US parameters (US $50,000-US $150,000 per QALY).

Incremental cost (ΔCost) was calculated from the chosen perspective. Among the 10 studies using only a health care payer perspective, incremental cost was calculated as the cost difference in health care service use and intervention delivery costs. In contrast, the single study using only a societal perspective captured only productivity losses and broader non–health care costs. Among the 9 studies adopting both perspectives, incremental costs were initially calculated from the health care payer perspective and then extended to include productivity losses and informal caregiving costs. Notably, this dual-perspective approach frequently shifted interventions from costlier-but-effective (payer) to cost-saving (societal), as seen in Step-by-Step in Lebanon [20].

Incremental effect (ΔEffect) was measured as QALYs for CUAs or clinical units for CEAs. A positive ΔEffect indicated improved health outcomes in the digital intervention group compared with the comparator, while negative incremental costs indicated that the intervention reduced costs.

Table 2 summarizes the key economic findings. When an intervention was less costly (negative ΔCost) and more effective (positive ΔEffect), it was considered dominant, such as NIDUS-Family [19], iCBT in Germany [25], Parent Positive, Step-by-Step, and the BlueIce app. When both ΔCost and ΔEffect were positive, it was more costly while improving outcomes.

Table 2. Summary of incremental cost-effectiveness of digital health interventions in community mental health settings.

Author (year)	Study design	Sample size, n	Intervention vs comparator	Time horizon	Incremental cost in original currency[a]	Incremental cost in 2025 US $[b]	Incremental effect	ICER[c]/key metric	WTP[d] threshold	Cost-effectiveness conclusion
Paterson et al [18], 2025	Model	354 (trial); 1000 (model cohort)	Independence-preserving (SENSE-Cog) vs no intervention	10 years	+£106	+US $135	+0.0125 QALYs	US $10,800/QALY[e]	£20,000/QALY	Cost-effective (hypothetical intervention, 7.5% effect; dominant at 10%)
Isaaq et al [19], 2025	RCT[f]	302	NIDUS-Family vs TAU[g]	12 months	–£8176	–US $10,384	+0.008 QALYs	Dominant[h]	£20,000-£30,000/QALY	Dominant
Wasil et al [13], 2021	RCT	103	Shamiri-Digital vs active control	2 weeks	~US $3.57 per student	US $4.28	0.50 symptom reduction PHQ-8[i]	US $25.35-US $34.62 per student with meaningful improvement	No threshold stated	Not judged (no threshold stated)
Zhou et al [22], 2025	RCT	244	Unguided iCBT[j] vs waitlist	8 weeks-12 months	+CNY 201.90	+US $28	+0.0041 QALYs	US $6777/QALY	1-3 times GDP per capita (CNY 80,976-242,928/QALY)	Cost-effective
Ali et al [23], 2024	RCT	175	CCBT[k] vs TAU	9 months, extrapolation: 12, 24, 36, 48, and 60 months	+US $714.6	+US $736	+0.021 QALYs	US $37,295/QALY	US $50,000/QALY	Cost-effective
Kraepelien et al [24], 2018	RCT	945	iCBT vs TAU	3 months, 12 months	+€297.5	+US $415	+0.0338 QALYs	US $12,300/QALY	£20,000/QALY; SEK100,000-500,000/QALY	Cost-effective
Baumann et al [25], 2020	Model	Simulated cohort	iCBT vs face-to-face CBT	3 years	–€2536	–US $3287	+0.260 QALYs	Dominant	€8580-18,420/QALY	Dominant

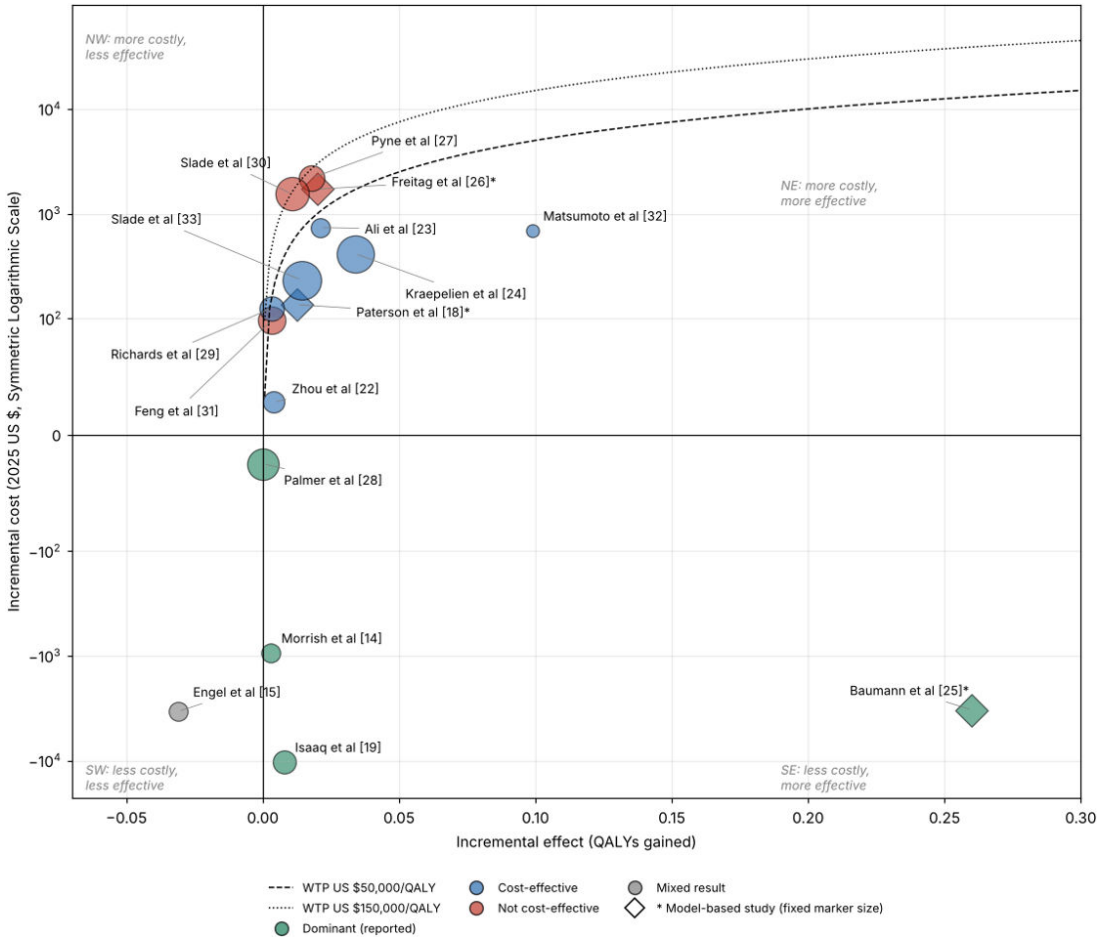
Author (year)	Study design	Sample size, n	Intervention vs comparator	Time horizon	Incremental cost in original currency[a]	Incremental cost in 2025 US $[b]	Incremental effect	ICER[c]/key metric	WTP[d] threshold	Cost-effectiveness conclusion
Freitag et al [26], 2024	Model	4,977,172 (simulated)	mHealth[l] apps vs standard care	5 years	+€1536	+US $1710	+0.020 QALYs	€81,335/ QALY (≈US $90,500)	€54,794/ QALY	Not cost-effective
Pyne et al [27], 2010	RCT	395	Telemedicine vs usual care	12 months	+US $1528	+US $2190	+0.018 QALYs	$122,700/ QALY	US $50,000/ QALY	Not cost-effective
Palmer et al [28], 2023	RCT	646	Parent positive vs follow-up as usual	2 months	–£18.89	–US $25	+0.000132 QALYs	Dominant	£20,000-£30,000/ QALY	Dominant
Richards et al [29], 2020	RCT	361	iCBT (SilverCloud) vs waitlist	8 weeks, extrapolation: 12 months	+£95.72	+US $125	+0.0032 QALYs	£29,764/ QALY (≈US $38,700)	£20,000-£30,000/ QALY	Cost-effective (borderline; 46.6% probability at £30,000)
Abi Hana et al [20], 2024	RCT	1249	Step-by-Step vs enhanced usual care	20 weeks	–US $24	–US $24	0.23 treatment response/ 0.058 remission	Dominant	Not specified	Dominant
Olmstead et al [16], 2010	RCT	77	CBT4CBT vs TAU	8 weeks	+US $39	+US $53	+1.83 drug-free specimens	$29/ additional drug free specimen	No threshold stated	Not judged (no threshold stated)
Murphy et al [17], 2016	RCT	507	TES[m] vs TAU	12 weeks, 36 weeks	+US $278	+US $352	+0.13 abstinent years	US $11,490/ abstinent year[n]	US $20,000/ abstinent year	Cost-effective
Slade et al [30], 2024	RCT	739	NEON[o] vs delayed access	1 year	+£1177	+US $1540	+0.0107 QALYs	US $144,500/ QALY	£20,000-£30,000/ QALY	Not cost-effective
Engel et al [15], 2024	RCT	170	Horyzons vs TAU	18 months	–AUD 4952	–US $3401	–0.031 QALYs	US $110,000/ QALY[p]	Not specified	Less costly, less effective (QALY); dominant on social functioning
Feng et al [31], 2022	RCT	468	DIALOG+ vs standard care	6 months	+€84.17	+US $98.20	+0.0032 QALYs	US $30,688/ QALY	1-3 times GDP[q] per capita (€4587-13,761/ QALY)	Not cost-effective
Matsumoto et al [32], 2024	Single arm	25	Guided iCBT vs no comparator	2 years	+ JPY 99,000	+US $683	+0.09905 QALYs	US $6894/ QALY	JPY 5,000,000/ QALY	Cost-effective
Slade et al [33], 2024	RCT	1023	NEON vs usual care	12 months	+£178	+US $232	+0.0142 QALYs	US $16,300/ QALY	£20,000-£30,000/ QALY	Cost-effective
Morrish et al [14], 2024	RCT	170	BlueIce app vs usual care	6 months	–£722.09	–US $945	+0.003 QALYs	Dominant	£20,000/ QALY	Dominant

[a]Incremental costs in the original study currency.
[b]Incremental costs adjusted to the 2025 price year and expressed in 2025 US $ using national consumer price indices and contemporary exchange rates. Approximate conversion factors (original currency to 2025 US $, including the inflation adjustment): £1=US $1.27-1.32; €1=US $1.11-1.40 (varies with study year); AUD 1=US $0.69; CNY 1=US $0.14; JPY 1=US $0.0069.
[c]ICER: incremental cost-effectiveness ratio.
[d]WTP: willingness-to-pay. WTP thresholds are shown in the original currency.
[e]QALY: quality-adjusted life year.
[f]RCT: randomized controlled trial.
[g]TAU: treatment as usual.

[h]Dominant: intervention is more effective and less costly.
[i]PHQ-8: 8-item Patient Health Questionnaire.
[j]iCBT: internet-based CBT.
[k]CCBT: computer-assisted CBT.
[l]mHealth: mobile health.
[m]TES: therapeutic education system.
[n]ICER for Murphy et al is as reported by the original authors.
[o]NEON: Narrative Experiences Online.
[p]ICER is per QALY lost; the intervention was cheaper but less effective.
[q]GDP: gross domestic product.

The distribution of the 16 studies reporting QALY-based outcomes across the 4 quadrants is illustrated via a cost-effectiveness plane in Figure 2. Murphy et al [17] was excluded because the QALY differences were negligible and not statistically significant. Hence, Table 2 reports its cost per abstinent year.

Figure 2. Cost-effectiveness plane of QALY-based included studies (n=16) [14,15,18,19,22-33]. Incremental cost (2025 US $, Symmetric Logarithmic Scale) is plotted against incremental effect (QALYs). Bubble size is proportional to study sample size; model-based studies are marked with an asterisk and a fixed-size diamond marker. Dashed and dotted lines show illustrative willingness-to-pay (WTP) thresholds of US $50,000 and US $150,000 per QALY; the thresholds used in the original studies were country-specific and differ. Murphy et al [17] is not plotted because the QALY differences were negligible and not statistically significant. Its cost per abstinent year is given in Table 2. QALY: quality-adjusted life years.



These ICERs were then judged according to their country-specific thresholds. The intervention is cost-effective when the ICER falls below the WTP threshold (13/20, 65%). Conversely, in several studies, ICERs exceeded the applicable WTP threshold, hence were not considered cost-effective (4/20, 20%). Three (15%) studies did not state a threshold. Analysis of the 16 QALY-reporting studies via a cost-effectiveness plane (Figure 2) showed that 4 (25%) studies were in the dominant quadrant (less costly and more effective), 11 studies (69%) were more costly but more effective, and 1 (6%) study was less costly but less effective.

Discussion

This review presents a synthesis of the findings of the 20 included economic evaluations of DMHIs delivered in community settings. The evidence is synthesized with attention to mental illnesses, interventions, economic methodology, and outcomes.

Types of Mental Illnesses, Interventions, and Outcome-Measuring Tools

Across the studies, DMHIs were closely aligned with the clinical needs of specific types of mental illnesses. Among the most common types of mental illnesses, which were depression and anxiety, the evidence was dominated by CBT-based digital approaches aimed at symptom reduction. The evaluations were primarily assessed using symptom-specific scales such as PHQ-9 and GAD-7, complemented by health utility and QoL measures, most commonly the EQ-5D.

Subsequently, these types of interventions were frequently integrated into optimizing care pathways to meet needs in low-resource settings [7,9,11]. In contrast, DMHIs for psychosis and dementia focused on social functioning and independence outcomes captured through instruments such as the PSP and BADLS [15,18].

Economic resource use across mental illnesses was generally estimated using the standardized inventories like CSRI and TiC-P, reflecting health care use in community settings. Meanwhile, for substance use disorder, self-harm, and conduct problems, the interventions were primarily focused on skills training, crisis support, and preventive approaches. The outcomes were measured using the specific indicators, such as years of abstinence and drug-free specimens, aligning with the clinical aims of the interventions [16,17].

Economic Methods

Across studies, economic evaluations were strongly shaped by the combined influence of study design, time horizon, and evaluation method [11]. Most studies were trial-based economic evaluations (CUA or CEA) that were mostly constrained to short follow-up periods (from 8 wk to 6 mo) [14,16,22]. This was commonly due to budget and feasibility constraints, including waitlist controls and limited service-delivery windows, which restrict the ability to evaluate longer-term outcomes [8].

In contrast, decision-analytic models used longer time horizons to project costs and effects over 3 to 10 years, demonstrating that some digital interventions appear more favorable over longer time frames, though these long-term projections depend on strong extrapolation assumptions. Moving forward, using robust long-term observational data could provide more credible real-world evidence than relying solely on predictive modeling. Taken together, these findings suggest that short-term trial-based evaluations may underestimate the long-term value of some DMHIs, supporting the use of longer time horizons to inform policy and resource allocation [8,11,23].

Outcomes/ICER

Economic findings and the resulting ICER were significantly influenced by the choice of perspective and outcome measure [11,20]. Most studies used QALYs within CUA to evaluate the digital interventions, while CEA relied on clinical outcomes. The health care payer or provider perspective often showed modest health gains at additional cost, and therefore many fell below the WTP thresholds, which were considered cost-effective [23,24].

However, when a societal perspective, including productivity gains and informal care, was calculated, the results became more favorable and, in some cases, reversed from incremental to dominant. In addition, many CBT-based interventions in depression and anxiety were cost-effective [22-24]. Aside from the findings driven by the target population and type of digital interventions, these results highlight that cost-effectiveness was consistently demonstrated by low marginal costs and sustained effects, while smaller health gains were connected to the analytic perspective and time horizon adopted [23-25].

In particular, this discrepancy highlights how outcome selection shapes economic interpretations. Engel et al [15] show that CUA (measured via QALYs) and CEA (measured via social functioning) conclusions diverged for the same intervention.

Sensitivity Analysis

Most studies used deterministic and probabilistic sensitivity analyses to test the robustness of their findings. Generally, iCBT for depression remained cost-effective across scenarios, while interventions like DIALOG+ for psychosis were not cost-effective [31].

Recommendation: Implications for Policy and Practice

This review demonstrates that DMHIs are often a cost-effective use of resources, but their value depends on the specific intervention, the perspective, and the time horizon. Regarding intervention type, CBT-based programs in the depression and anxiety populations have the strongest and most consistent economic evidence, making them the highest priority for funding and scale-up.

Adopting a societal perspective in decision-making can reveal significant broader economic benefits, including cost savings. Implementation should consider staff time, licensing costs, and engagement rates to ensure value. In LMICs, digital tools can be worthwhile but must be evaluated against local WTP thresholds and delivery costs.

Future Research

Future trials should extend follow-up beyond 12 months to capture sustained effects and real-world implementation costs. To improve comparability, future economic evaluations should use EQ-5D as a standard utility anchor or clearly map other instruments to it. Active comparators (such as face-to-face CBT) should be applied more frequently instead of waitlist controls to provide more realistic estimates of value. Finally, evaluations in diverse settings should collect local resource use data, include productivity and informal care costs, and test different pricing models for digital tools. For future work, the cost-effectiveness plane analysis produced in this review could be expanded by using formal quantitative meta-analyses using the new {ΔCost, ΔEffect, N} framework [34]. However, this will require greater standardization in

outcome and perspective reporting across the field to enable robust pooled statistical estimation.

Strengths and Limitations

This review has several strengths. First, most included studies were methodologically robust RCTs with embedded economic evaluations, strengthening the internal validity of the reported ICERs. Second, the evidence covered a wide range of mental illnesses and countries, including both HICs and LMICs, enhancing broader relevance. Third, many studies reported results from multiple economic perspectives, allowing us to demonstrate how conclusions change when societal costs are integrated. Fourth, we explicitly analyzed the role of perspective and time horizon and appraised methodological quality using the CHEC, improving transparency. The CHEC percentage categories are a descriptive convention, not a validated threshold, and should be interpreted with the item-level ratings. Finally, despite heterogeneity, the findings consistently indicated that guided CBT-based interventions are cost-effective, providing a coherent overall conclusion.

Several limitations were also noted. Many evaluations were based on short follow-up periods, requiring modeling projections for longer-term effects. The heterogeneity in outcome and utility measures makes ICERs difficult to compare across studies. The frequent use of waitlist controls in several trials may inflate effect sizes compared to active comparators. As this review relied on narrative synthesis rather than statistical testing or funnel plots, publication bias could not be formally quantified. This risk remains a moderate concern due to the high proportion of positive or cost-effective findings. This pattern aligns with broader health economics publication trends, where studies with nonsignificant clinical effects or unfavorable ICERs are less likely to undergo full economic evaluation. Although the inclusion of several neutral or non–cost-effective evaluations [30,31] indicates a robust search strategy that did not exclusively capture positive results, it cannot rule out underlying publication bias within the wider literature.

Also, cost data were often incomplete, with informal care and productivity losses omitted or estimated retrospectively, creating uncertainty in incremental costs. QALY gains were frequently small and statistically nonsignificant, largely due to short follow-up durations and modest sample sizes rather than a lack of true clinical benefit. This pattern stems from study design parameters rather than limitations of the evaluated interventions. Finally, most primary studies were conducted in high-income health systems, limiting direct applicability to lower-resource settings without local cost adjustments. Evidence from LMICs came from 4 studies (Kenya, Lebanon, China, and Southeast Europe), which generally reported lower absolute costs than high-income studies, so ICERs and WTP thresholds are not directly comparable across income settings.

Methodologically, due to the substantial heterogeneity, the findings are based on a narrative synthesis. These limitations imply that the conclusions must be interpreted in light of short time horizons, mixed comparators, and incomplete cost capture in the underlying studies.

Conclusions

This review shows that DMHIs in community settings can deliver good value for money, especially for depression and anxiety, when using guided iCBT/CCBT models. When a wider societal perspective is adopted, several interventions become cost-effective. The evidence varies across populations and interventions. Common limitations include short time horizons, the use of waitlist controls, and heterogeneous outcome measures.

Taken together, the findings are supportive, but they warrant cautious interpretation. Digital interventions can help scale up mental health care at a reasonable cost, but resource allocation decisions must consider the economic perspective and time horizon. Future research should use a standard utility anchor (ideally EQ-5D), collect more complete resource use data, use active comparators, and extend follow-up to at least 12 months. This will provide policymakers with the robust, comparable evidence needed to identify which digital tools deliver sustained health gains and true value for money.

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Generative AI Use

Generative AI tools were used in a limited, supporting role. Claude (Anthropic) was used to check consistency between the data tables and the text, to generate the plotting code for Figures 1 and 2, and to assist with the wording and formatting of the response to reviewers. ChatGPT (OpenAI) was used minimally for brainstorming ideas. Generative AI was not used for the literature search, study screening, or data extraction, which were done manually by the authors. All AI-assisted outputs were reviewed and verified by the authors, who take full responsibility for the content of this paper.

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Data Availability

All data generated or analyzed during this study are included in this published paper and its supplementary information files.

Authors' Contributions

Conceptualization: AF, MHF, MRAM
Data curation: AF, MHF, AA, MRAM
Formal analysis: AF, MHF, FD, SW, MAM, NMY, AA, MRAM
Funding acquisition: MRAM
Investigation: AF, MHF, FD, SW, MAM, NMY, AA, MRAM
Methodology: AF, MHF, FD, SW, MRAM
Project administration: AF
Supervision: MRAM, FD, SW
Validation: FD, SW, MAM, NMY
Visualization: AF
Writing – original draft: AF, MHF, FD, SW, MAM, NMY, AA, MRAM
Writing – review & editing: AF, MHF, FD, SW, MAM, NMY, AA, MRAM

Conflicts of Interest

None declared.

Multimedia Appendix 1

The keywords used to search related papers in the systematic review.
[DOCX File (Microsoft Word File), 9 KB-Multimedia Appendix 1]

Multimedia Appendix 2

Quality assessment of included economic evaluations using the CHEC checklist.
[DOCX File (Microsoft Word File), 13 KB-Multimedia Appendix 2]

Checklist 1

PRISMA 2020 abstract checklist.
[DOCX File (Microsoft Word File), 20 KB-Checklist 1]

Checklist 2

PRISMA 2020 checklist.
[DOCX File (Microsoft Word File), 26 KB-Checklist 2]

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Abbreviations

BADLS: Bristol Activities of Daily Living Scale
CBT: cognitive behavioral therapy
CCBT: computer-assisted cognitive behavioral therapy
CEA: cost-effectiveness analysis
CHEC: Consensus on Health Economic Criteria
CHEERS: Consolidated Health Economic Evaluation Reporting Standards
CHU-9D: Child Health Utility Nine-Dimension
CSRI: Client Service Receipt Inventory
CUA: cost-utility analysis
DMHI: digital mental health intervention
GAD-7: Generalized Anxiety Disorder-7
HIC: high-income country
HRQoL: health-related quality of life
iCBT: internet-based cognitive behavioral therapy
ICER: incremental cost-effectiveness ratio
LMIC: low- and middle-income country
mHealth: mobile health
NICE: National Institute for Health and Care Excellence
NIDUS: New Interventions for Independence in Dementia Studies
NMB: net monetary benefit
OCD: obsessive-compulsive disorder
PHQ-9: 9-item Patient Health Questionnaire
PICO: Population, Intervention, Comparator, Outcome
PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analyses
PSP: Personal and Social Performance Scale
QALY: quality-adjusted life year
QoL: quality of life
RCT: randomized controlled trial
ReQoL: Recovering Quality of Life
SDS: Sheehan Disability Scale
SF-12: 12-item Short-Form Health Survey
SF-6D: Short-Form Six-Dimension
TiC-P: Trimbos/iMTA Questionnaire for Costs Associated with Psychiatric Illness
WHO: World Health Organization

WSAS: Work and Social Adjustment Scale
WTP: willingness-to-pay

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